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EXPEDITION OF THE CALIFORNIA ACADEMY OF SCIENCES TO THE GALAPAGOS ISLANDS, 1905-1906

XIV

THE ANTS OF THE GALAPAGOS ISLANDS[1]

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Since the memorable voyage of the "Beagle" in 1835, more than a dozen biological expeditions have explored the Galapagos Islands, but none of the collectors, with a single exception, has bestowed more than the most casual attention on the ants, so that our knowledge of these insects and their distribution has been too fragmentary to have any weight in the famous controversy concerning the origin of the archipelago and its fauna. In 1877 Frederick Smith[2] described three species of *Camponotus* from Charles Island, two (*C. planus* and *macilentus*) taken by Darwin on the voyage of the "Beagle" and one (*C. senex*) taken by Cookson on the voyage

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 137.

[2] *Smith, Frederick.* Hymenoptera and Diptera in "Account of the Zoological Collection made during the visit of H. M. S. 'Peterel' to the Galapagos Islands." Proc. Zool. Soc. 1877, pp. 82-84.

of the "Peterel" in 1875. Concerning the ants taken by the "Albatross" expedition of 1888, Howard[3] in 1890, makes only the following statement: "dark-colored species of the genus *Camponotus* was collected, one male from Albemarle Island, numerous males and two females from Charles Island. Of a light-colored species of the same genus seven males were taken on Charles Island and one on Albemarle Island." These were, without doubt, the sexual forms of Smith's *C. planus* and *macilentus*. In 1893 Emery[4] recorded the following species which he had received from Dr. George Baur, who made an expedition to the islands in 1891 in a sloop chartered in Guyaquil: *Solenopsis geminata* Fabr., *Tetramorium guineënse* Fabr., *Tapinoma melanocephalum* Fabr., *Odontomachus bauri* Emery, and *Camponotus peregrinus* Emery. All these forms were taken at Chatham Island, and all, except the first, were found on the ship, so that two of them, *Tetramorium guineënse* and *Tapinoma melanocephalum,* may have had their nests in the woodwork and may have come from Guyaquil. The *Camponotus peregrinus* can hardly be more than a variety of Smith's *planus*. Emery also mentions the receipt of five males of the genus *Camponotus* taken on one of the "Albatross" voyages: "One of them is black and comes from Albemarle and Charles islands, the other, of a testaceous color, with very pale legs, is represented by two specimens from Charles." These seem to be part of the two series mentioned by Howard, i. e., specimens of C. *planus* and *macilentus*. Since the publication of Emery's paper no additions have been made to the seven or eight forms recorded from the archipelago. I was much interested, therefore, to learn from Dr. F. X. Williams, that he had collected a number of ants while he was a member of the California Academy of Sciences Expedition (Voyage of the "Academy") in 1905 to 1906. Through the kindness of Dr. E. C. Van Dyke the specimens were loaned me for study. Dr. Williams also informed me that some ants had been taken by the Hopkins-Stanford Expedition to the Galapagos (Voyage of the "Julia E. Whalen") in 1898 to 1899,

[3] *Howard, L. O.* Scientific Results of Explorations by the U. S. Fish Commission Steamer Albatross. V. Annotated Catalogue of the Insects Collected in 1887–1888. Proc. U. S. Nat. Mus. 12, 1889, pp. 185-207.

[4] *Emery, Carlo.* Notices sur Quelques Fourmis des Îles Galapagos. Ann. Soc. Ent. France, 63, 1893, pp. 89-92.

but correspondence with Prof. Vernon Kellogg revealed the fact that the specimens were no longer in the collections of Stanford University and that their whereabouts could not be ascertained. More recently the curators of the National Museum have generously loaned me the ants taken on some of the voyages of the "Albatross". Though in part poorly preserved, this material has been very useful in supplementing Dr. Williams's collection, which was made with great care and considerably increases our knowledge of the ant fauna of the archipelago.

As shown in the accompanying table, the Galapagos ants which I have studied, comprise 36 different forms, representing 18 species, 10 genera and four of the five subfamilies of *Formicidæ*. Significantly the subfamily *Dorylinæ* is not represented. None of the genera is peculiar to the islands. Six

Names of Species, Subspecies and Varieties	Narborough	Albemarle	Duncan	Charles	Hood	Chatham	Barrington	Indefatigable	James	Tower	Bindloe	Abingdon
Cylindromyrmex striatus Mayr								X				
Odontomachus bauri Emery				X		X						
Pheidole williamsi Wheeler								X				
Pheidole sp		X										
Monomorium pharaonis L								X				X
Solenopsis sævissima F. Smith								X				
Solenopsis geminata Fabr						X						
Solenopsis galapageia Wheeler				X								
Solenopsis pacifica Wheeler		X								X		
Solenopsis rubida Wheeler					X							
Tetramorium guineense Fabr		X				X						
Tetramorium simillimum F. Smith				X								
Dorymyrmex albemarlensis Wheeler		X										
Tapinoma melanocephalum Fabr					X	X		X				
Prenolepis longicornis Latreille				X								
Prenolepis itinerans Forel						X		X				
Prenolepis nesiotis Wheeler									X			
Camponotus senex F. Smith				X								
Camponotus macilentus F. Smith				X								
Camponotus jacobensis Wheeler									X			
Camponotus albemarlensis Wheeler		X										
Camponotus vulcanalis Wheeler		X										
Camponotus duncanensis Wheeler			X									
Camponotus narboroënsis Wheeler	X											
Camponotus hoodensis Wheeler					X							
Camponotus barringtonensis Wheeler							X					
Camponotus bindloënsis Wheeler											X	
Camponotus macilentus var										X		
Camponotus planus F. Smith				X								
Camponotus peregrinus Emery						X						
Camponotus isabelensis Wheeler		X										
Camponotus indefessus Wheeler								X				
Camponotus santacruzensis Wheeler								X				
Camponotus fidelis Wheeler							X					
Camponotus fernandinensis Wheeler	X											
Camponotus pinzonensis Wheeler			X									
Number of forms on each island	2	7	2	7	3	6	2	8	2	2	1	1

of the species, *Monomorium pharaonis, Tetramorium guineënse* and *simillimum, Tapinoma melanocephalum, Prenolepis longicornis* and *P. vividula itinerans,* are well-known tropical "tramps", evidently introduced by commerce within recent times. Not improbably three others, *Solenopsis geminata, S. sævissima* and *Camponotus senex,* have been similarly introduced. Only nine species, therefore, would seem to be clearly indigenous to the islands. All of these are distinctly neotropical in their affinities and all but three, or possible four of them, namely *Pheidole williamsi, Pheidole* species, *Camponotus macilentus* and *C. planus,* are either well-known species, widely distributed in tropical and subtropical portions of America, or merely subspecies or varieties of such forms. Nevertheless, if we consider the distinct forms, no fewer than 26, or 72.2%, of the 36 are endemic, and these forms would undoubtedly rank as true species if the same estimate were applied to the subspecies and varieties of ants as is applied by the ornithologists and mammalogists to their taxonomic categories. This high percentage of endemicity agrees with what has been observed in other groups of organisms. Stewart[5] cites 615 species of plants from the archipelago, with 252, or 40.9%, endemic. Among the birds, according to Ridgway[6], 13.04% of the 46 genera are endemic; among the Arachnida, according to Banks[7], 31, or 57.4% of the 54 species are endemic; among the Orthoptera, according to McNeill[8] and Snodgrass[9], and among the Coleoptera cited by Linell[10], the percentage of endemicity is also very high, although the authors do not give precise percentages.

Many writers have noticed closer affinities between the Galapagos and Central American or West Indian species than between those of the Galapagos and the western coast

[5] *Stewart, Alban.* A Botanical Survey of the Galapagos Islands. Expedition of the California Academy of Sciences to the Galapagos Islands, 1905-1906. II. Proc. Calif. Acad. Sci. (4) 1, 1911, pp. 7-288, 18 pls.

[6] *Ridgway, Robert.* Birds of the Galapagos Archipelago. Proc. U. S. Nat. Mus. 19, 1896, pp. 459-670, 2 pls.

[7] *Banks, Nathan.* Arachnida. Papers from the Hopkins-Stanford Galapagos Expedition 1898-1899, VII. Entomological Results (6). Proc. Wash. Acad. Sci. 4, 1902, pp. 49-86, 3 pls.

[8] *McNeill, Jerome.* Orthoptera. Papers from the Hopkins-Stanford Galapagos Expedition 1898-1899, IV. Entomological Results (4). Proc. Wash. Acad. Sci. 3, 1901, pp. 487-506, 10 figs.

[9] *Snodgrass, R. E.* Schistocerca, Sphingonotus and Halmenus. Papers from the Hopkins Stanford Galapagos Expedition. 1898-1899, VIII, Entomological Results (7). Proc. Wash. Acad. Sci. 4, 1902, pp. 411-455, 2 pls.

[10] *Linell, M. L.* On the Coleopterous Insects of the Galapagos Islands. Proc. U. S. Nat. Mus. 21, 1898, pp. 249-268.

of South America, but no such difference in affinities can be detected among the ants, because most of the neotropical species to which the Galapagos forms are most closely allied, are very widely distributed and because our knowledge of the ants of Ecuador, Peru and Chili is less complete than that of the ants of the West Indies, Central America and Brazil. I suspect that a similar dearth of knowledge of the western South American species of other groups may account for the high percentage of West Indian and Central American elements recorded by several authors as obtaining among the Galapagos organisms, as e. g., by Banks, who mentions only five of the 54 Galapagos spiders as being known from Western South America as compared with 14 from Central America, Colombia and the West Indies.

Special interest attaches to the two species of *Camponotus, macilentus* and *planus,* as each of them is represented by distinct varieties on each of several of the larger islands. In fact, Albemarle Island possesses two varieties of *macilentus* and Indefatigable Island two of *planus.* The distribution of the various forms is shown in the following table:

	Islands.	
macilentus, typical....	Charles.....	*planus,* typical
	Chatham.....	var. *peregrinus*
var. *narboroënsis*.....	Narborough...	var. *fernandinensis*
var. *albemarlensis*.....	Albemarle.....	var. *isabelensis*
var. *vulcanalis*.....		
var. *duncanensis*.....	Duncan.....	var. *pinzonensis*
	Indefatigable..	var. *indefessus*
		var. *santacruzensis*
var. *hoodensis*.....	Hood.....	
var. *barringtonensis*...	Barrington....	var. *fidelis*
var. *jacobensis*.....	James.....	
var. *bindloënsis*.....	Bindloe.....	
var.....	Tower.....	

Although a similar "harmonic" distribution has been observed in birds, reptiles and plants, the only group of invertebrates in which it has been recorded, is, to my knowledge, the Acridians. Snodgrass cites three species of

Schistocerca and two of *Sphingonotus,* each of which is represented by a recognizable subspecies or variety on each of several islands. The resemblance to the two species of *Camponotus* is further shown by the fact that *Schistocerca melanocera* is represented by two subspecies on Albemarle and that two forms of *Sphingonotus tetranesiotis* occur on Barrington and two on Indefatigable.

On the whole, the ant-fauna of the Galapagos is decidedly poor for islands lying on the equator and possessed of an abundant and varied flora. Dr. Williams informs me that even the colonies of the species which do occur on the larger islands are far from numerous and are found only after diligent search. Only one or two forms have been taken on most of the islands. Chatham has six, Charles and Albemarle each seven, and Indefatigable eight, but even these numbers indicate a very limited fauna. At first sight this might be regarded as evidence that the ant-fauna was accidentally introduced and had lingered on, undergoing slow varietal and subspecific modification in response to the different physical conditions on the various islands. In my opinion, however, no such conclusion can be legitimately advanced. The poverty of the fauna is more probably due to adverse conditions, as ants are not fond of volcanic soil, probably because it gives off deleterious gases in the process of decomposition, or does not afford proper nesting sites, as would be the case with the great stretches of hard lava said to occur on some of the Galapagos islands. The climatic conditions, moreover, are decidedly unfavorable, as the littoral zone of the islands up to 800 feet is very arid, while the more densely wooded portions, at higher levels, are cool and damp. I have pointed out in other publications that moisture coupled with a low temperature is very unfavorable to ant-life and have called attention to the meagre faunas of such regions as New Zealand, Great Britain and the Selkirk Mountains of British America in support of this contention.

The bearing of my study of the Galapagos ants on the two great rival hypotheses that have been advanced to account for the origin of the islands and of their biota, is indecisive. A study of the literature shows that the problem is still far from solution and that probably as much evidence

can be adduced in support of the subsidence or "continental" as for the emergence or "oceanic" origin of the archipelago. So evenly divided are the authorities that 19, namely, Darwin, Wallace, Hooker, A. Agassiz, Salvin, Griesebach, Engler, Moritz Wagner, Peschel, Wolf, Dall, Stewart, Stearns, Snodgrass, Heller, Robinson, Williams, McNeill and Matthew, have expressed themselves in favor of the "oceanic" hypothesis, while an equal number, namely, H. Milnes Edwards, Murray, Baur, Hemsley, Ridgway, Robinson and Greenman, Boetger, von Ihering, Handlirsch, Scharff, Ortmann, Ratzel, Günther, Sarasin, Gadow, Arldt, Barbour, and Van Denburgh, have expressed themselves as favoring a "continental" origin of the archipelago. Eleven other workers who have studied material from the islands, namely Banks, Coquillet, Currie, Heidemann, Kellogg, Gifford, Linell, Howard, Garman, Rothschild and Hartert, have not committed themselves to either hypothesis. Some of the authors who take sides in the controversy are evidently influenced by the fancied facilities afforded by their special groups of organisms for transportation by winds or currents from the western coast of South or Central America. The botanists find it easy to suppose that seeds and the spores of ferns have thus found their way to the islands, while herpetologists balk at postulating such means of transportation for the huge land tortoises which have been so carefully studied by Baur and by Van Denburgh. At least one of the authors, Robinson, has changed his views in the course of his studies. In his first paper on the flora, written in collaboration with Greenman[11], he favored the Murray-Baur hypothesis of a continental origin of the islands, but in a more voluminous work[12], based on additional collections, he returns to the older Darwin-Wallace hypothesis. Some authors, like Stearns[13], Dall[14] and Stewart, make much of the "flotsam and jetsom" origin of the Galapagos fauna and flora, whereas

[11] *Robinson, B. L., and Greenman, J. M.* On the Flora of the Galapagos Islands as shown by the collections of Dr. G. Baur. Amer. Journ. Sci., 50, 1895, pp. 135-176.

[12] *Robinson, B. L.* Flora of the Galapagos Islands. Papers from the Hopkins Stanford Expedition to the Galapagos Islands. Proc. Amer. Acad. Arts and Sci. 38, 1902, pp. 77-269, 3 pls.

[13] *Stearns, R. E. C.* Report on the Mollusk Fauna of the Galapagos Islands, with Descriptions of New Species. Proc. U. S. Nat. Mus. 16, 1893, pp. 353-450.

[14] *Dall, W. H.* Insular Landshell Faunas, Especially as Illustrated by the Data Obtained by Dr. G. Baur in the Galapagos Islands. Proc. Acad. Nat. Sci., Phila., 1896, pp. 395-459, 3 pls.

others like Scharff, very properly point to the lack of positive observations on any such method of transportation. The unbiassed worker can only conclude from what has been written on the subject, and, notwithstanding the many excellent monographs that have been produced on various portions of the fauna and flora, that we need a still more intensive and exhaustive exploration of the islands and above all a much better acquaintance with their geology than we now possess, before he can definitely accept either of the hypotheses.

Family FORMICIDÆ.

Subfamily PONERINÆ.

1. Cylindromyrmex striatus Mayr.

Cylindromyrmex striatus Mayr, Verh. zool. bot. Ges. Wien 20, 1870, p. 697 ♀ ; *ibid.*, 37, 1887, p. 546 ♀ (*nec* ☿, *nec* ♂); Emery, Ann. Soc. Ent. Belg. 45, 1901, p. 53; Gen. Insect. Ponerinæ, Fasc. 118, 1911, p. 15.

Holcoponera whymperi Cameron, in Whymper, Travels Andes Equator, Suppl. Append. 1891, p. 92, fig. ☿.

Cylindromyrmex whymperi Forel, Ann. Soc. Ent. Belg. 36, 1892, p. (2).

A large ocellate and a small nonocellate worker taken by F. X. Williams at Academy Bay, Indefatigable Island, agree perfectly with Cameron's figure of *Holcoponera whymperi* from Guyaquil, Ecuador. His specimen was taken indoors, which indicates that the species may occur about houses, unlike other Ponerinæ, and suggests that it may have been recently introduced into the Galapagos by vessels from the Ecuadorian or Peruvian Coast.

2. Odontomachus hæmatoda bauri Emery.

Odontomachus bauri Emery, Ann. Soc. Ent. France, 60, 1891, p. 591 ☿ ; *ibid.*, 63, 1893, p. 476, fig.

Odontomachus hæmatoda bauri Emery, Gen. Insect. Ponerinæ, Fasc. 118, 1911, p. 115.

Worker. Length 9—11 mm.

Differing from the worker of the typical form in having the head proportionally narrower behind, slightly narrower

mandibles, with longer preapical tooth, the smooth, shining portion of the occiput extending somewhat further forward and that of the sides of the head further dorsally. The longitudinal striæ of the pronotum and transverse striæ of the epinotum are somewhat coarser and the anterior surface of the petiole is rather coarsely, transversely striate. The pilosity, pubescence and color are much as in the typical *hæmatoda,* but the body has a somewhat bronzy lustre and the antennæ and legs are darker.

Female. Length 10—11 mm.

Very similar to the worker and differing from the female of the typical *hæmatoda* in the same characters. The wings measure only 7 mm. or somewhat less, however, whereas those of the typical *hæmatoda* measure at least 8 mm.

Male. Length 6 mm.

Closely resembling the male of the typical *hæmatoda,* except in color. The head, thorax, legs and antennæ are whitish yellow, with the epinotum, petiole and dorsal surface of the gaster dark brown, the venter brownish yellow. The mesonotum has a dark brown longitudinal spot on each side and a slightly paler median spot of the same color just behind its anterior border. Wings whitish, with pale brown stigma.

This form, which is extremely close to the typical *hæmatoda,* so widely distributed in the tropics of both hemispheres, was described by Emery from a single worker taken by Dr. G. Baur on Chatham Island. I have redescribed it from a number of workers and females and a single male taken by Dr. F. X. Williams on the same island and at Cormorant Bay, Charles Island. The specimens were nesting under stones from sea-level to an altitude of 1100 feet.

Subfamily MYRMICINÆ.

3. **Pheidole williamsi,** new species.

Soldier. Length 2.3—2.6 mm.

Head small, subrectangular, scarcely longer than broad and scarcely broader behind than in front, with rounded posterior and anterior corners, feebly excised posterior bor-

der, nearly straight sides and the eyes of moderate size and situated in front of the middle. Mandibles rather convex, with two large apical and several minute and rather irregular basal teeth. Clypeus short, flat, with the anterior border deeply notched in the middle. Frontal area triangular, not impressed; frontal carinæ short, subparallel in front, slightly diverging behind; median dorsal groove shallow, running only from the occipital excision to the middle of the head. Antennæ slender, scapes curved but not flattened at the base, only slightly thickened at their tips, which nearly reach the posterior corners of the head; all the funicular joints distinctly longer than broad; club slender, shorter than the remainder of the funiculus. Thorax rather small; pronotum very convex, broadest through the humeri, which are rounded; mesonotum in profile sloping, with a strong, short, transverse convexity in the middle; epinotum long, its base straight in profile, fully 1½ times as long as the declivity, which is concave; spines short, slender, longer than broad at their bases, shorter than their distance apart at the base, directed backward and upward and very slightly outward. Petiole narrower in front than behind through the node, which in profile has a long, concave anterior and short, feebly concave posterior slope and rather acute summit; seen from behind the superior border of the node is deeply notched in the middle. Postpetiole scarcely a fourth again as broad as the petiole, broader than long, transversely elliptical, with rounded sides and dorsal surface. Gaster as large as the head, of the usual shape. Legs rather slender, femora only feebly incrassated in the middle.

Shining; mandibles coarsely punctate; sides of clypeus and anterior half of the head longitudinally rugulose; remainder of head smooth and shining, with minute, scattered, piligerous punctures. Pronotum transversely rugulose; mesonotum, epinotum, petiole and postpetiole subopaque, finely and densely punctate; gaster and legs shining, with sparse piligerous punctures.

Whole body, including the legs and antennæ, covered with moderately abundant and rather coarse yellow hairs, varying in length but longer and more erect on the body, more reclinate on the scapes and legs.

Brownish yellow; legs paler; posterior two-thirds of head somewhat darker and more reddish, borders of mandibles blackish, anterior clypeal border deep red.

Worker. Length 1.5 mm.

Head elliptical, longer than broad, rounded and entire behind, with the eyes just in front of the middle of the sides. Mandibles rather narrow, with about six teeth. Clypeus convex in the middle, its anterior border feebly but distinctly notched in the middle. Frontal carinæ very short. Antennæ much as in the soldier, scapes reaching nearly one-third their length beyond the posterior border of the head. Thorax like that of the soldier, but the pronotum much less convex and narrower, the mesonotum much less convex in profile and the spines of the epinotum reduced to minute, slender teeth. Petiole slender, its node low, with entire superior border; postpetiole small, subglobular.

Smooth and shining; mandibles sparsely punctate; cheeks longitudinally rugulose; meso- and epinotum, petiole and postpetiole subopaque, finely and indistinctly punctate.

Pilosity shorter and much less conspicuous than in the soldier, appressed on the scapes and legs.

Yellow; dorsal surface of head and gaster brownish; mandibular teeth blackish.

Female. Length 5—5.5 mm.

Head resembling that of the soldier, but a little narrower in front than behind, with nearly straight posterior border. Thorax large, as broad as the head, mesonotum nearly circular, flattened, as is also the scutellum. Epinotum with the declivity sloping, distinctly longer than the base, the spines stout, scarcely longer than broad at their insertions. Petiolar node less deeply excised above and postpetiole more transverse than in the soldier. Gaster large, of the usual shape. Wings measuring about 6 mm.

Mandibles and clypeus rather shining, the former striato-punctate, the latter longitudinally rugose. Head subopaque, longitudinally rugose, the rugæ extending to the occiput where they are mingled with coarse longitudinal punctures. Pronotum, pleuræ, epinotum, petiole and postpetiole opaque and densely punctate. Epinotum coarsely transverely rugose between the spines, the postpetiole longitudinally rugose.

Mesonotum, paraptera and scutellum smooth and shining, with coarse, sparse, piligerous punctures. Gaster shining, finely shagreened and very sparsely and finely punctuate.

Pilosity much as in the soldier.

Brownish yellow; pleuræ, epinotum, nodes, posterior portion of each gastric segment, scutellum, a large spot on the middle of the mesonotum and the mandibular teeth, brown. Wings yellowish hyaline, with pale yellow veins and scarcely darker stigma.

Male. Length 4—4.5 mm.

Head through the eyes slightly broader than long, flattened above, produced behind in the ocellar region, with very short cheeks and large eyes. Mandibles minute, bidentate. Clypeus carinate, convex behind. Antennal scapes as long as the two basal funicular joints together. Thorax broad and short, flattened above; epinotum sloping, rounded, unarmed, without distinct base and declivity. Petiole and postpetiole like those of the soldier, the node of the former being lower, more rounded and entire.

Mandibles and clypeus shining. Head above more opaque, especially on the sides, rugulose. Thorax, postpetiole and gaster shining and sparsely punctate; pleuræ and epinotum subopaque, the latter longitudinally rugulose.

Pilosity as in the female, but shorter and less abundant.

Mandibles, clypeus, antennæ and legs pale yellow; remainder of body brown, the head darker behind, the sutures of the thorax broadly pale yellow. Wings colored as in the female.

Described from several specimens of each of the phases taken on Indefatigable Island by Dr. F. X. Williams.

Cotypes, 12 specimens, No. 444, Museum California Academy of Sciences.

The soldier of this species resembles that of *Ph. arhuaca* Forel of Colombia in size and coloration, but is very distinct in the longer antennæ, notched clypeus, different shape of the mesonotum and in the sculpture of the dorsal surface of the head. It is even more closely related to *Ph. alfaroi* Emery of Costa Rica, but the soldier of this species is larger (4.5 mm.) and differs considerably from *williamsi* in the structure of the thorax, petiole, epinotal spines, etc.

4. **Pheidole,** species.

Among the "Albatross" material of the National Museum there are several poorly preserved or defective females and males belonging to a small *Pheidole* of the *flavens* group from Albemarle Island. One of these, a female, of which only the head and thorax remain, is labelled *"Pheidole galapagensis* Ashmead, type, No. 5515". Nothing can be done with this material at the present time, since soldiers are lacking and since our knowledge of the females and males of the known species of the large and exasperating group of *Pheidole* to which it belongs is very fragmentary.

5. **Monomorium pharaonis** (L.)

Formica pharaonis Linné, Syst. Nat. Ed. 10, 1, 1758, p. 580 ☿.

Formica antiguensis Fabricius, Ent. Syst. 2, 1793, p. 357.

Myrmica domestica Shuckard, Mag. Nat. Hist. (2), 1838, p. 626 ☿ ♀.

Myrmica unifasciata Bostock, Trans. Ent. Soc. London, 2, 1839. Proc. LI-LII.

Atta minuta Jerdon, Madras Journ. Litt. and Sci. 17, 1851, p. 105.

Myrmica (*Monomorium*) *fragilis* F. Smith, Catalog. Hymen. Brit. Mus. 6, 1858, p. 124 ☿.

Myrmica (*Monomorium*) *contigua* F. Smith, *Ibid.,* p. 125 ♀.

Myrmica (*Monomorium*) *molesta* F. Smith (*nec* Say), *Ibid.,* p. 122 ☿ ♀ ♂.

Monomorium pharaonis Mayr, Verh. zool. bot. Ges. Wien. 12, 1862, p. 752.

Myrmica pharaonis Roger, Berl. Ent. Zeitschr. 6, 1862, p. 294 ♀ ♂.

Diplorhoptrum domesticum Gaskell, Ent. Month. Mag. 13, 1877, p. 254.

Two workers from Indefatigable Island and four workers and three deälated females from Abingdon Island (F. X. Williams). This common house and ship ant has evidently been imported into the islands by commerce.

6. **Solenopsis sævissima** F. Smith.

Myrmica sævissima F. Smith, Trans. Ent. Soc. London (2) 3, 1855, p. 166 ☿. Pl. 13, Fig. 18; Bates, Natural. Riv. Amazon, 1863; Trans. Ent. Soc. London (3) 1, 1864, Proc. 214.

Solenopsis geminata Fabricius race *pylades* Forel, Ann. Soc. Ent. Belg. 48, 1904, p. 172 ♀.

Solenopsis pylades Forel, Deutsch. Ent. Zeitschr. 1909, p. 268 ☿ ♀.

Solenopsis sævissima Wheeler, Bull. Amer. Mus. Nat. Hist., 34, 1915, p. 395; Psyche, 23, 1916, p. 142.

A single worker from Indefatigable Island (F. X. Williams), unmistakably belongs to this species, though it is somewhat damaged. The hairs on the body, however, are more abundant, more flexuous and paler than in my specimens from Argentina, Brazil and British Guiana, but in this respect the Galapagos specimen agrees with a series taken by Silvestri at Talca, Chili. *S. sævissima,* as the foregoing localities show, is very widely distributed in tropical America. It was originally described from Brazil.

7. **Solenopsis geminata** (Fabricius).

Emery records this species as having been taken by Baur on Chatham Island. Perhaps the specimens belong to the following variety. I have omitted the long and tangled synonymy of *S. geminata,* much of which can be found in Dalla Torre's Catalogus Hymenopterorum 7, 1893, p. 76.

8. **Solenopsis geminata galapageia,** new variety.

Several workers and females taken by Dr. Williams on Charles Island "under stones near top of crater" average smaller than the corresponding phases of the typical *geminata.* The females are only 6—6.5 mm., the largest workers only 4—4.5 mm., whereas the females of the typical *geminata* measure 7—8 mm., the largest workers 6—6.5 mm. In color the Galapagos specimens are much like the typical Central

and South American specimens, being somewhat paler than the var. *nigra* Forel and darker than the var. *diabola* Wheeler.

Cotypes, 6 specimens, No. 445, Museum California Academy of Sciences, and 8 specimens in author's collection.

9. **Solenopsis globularia pacifica**, new subspecies.

Worker. Eyes slightly smaller, pilosity longer and coarser, postpetiole and gaster distinctly more voluminous as compared with the petiole than in the typical form, represented in my collection by specimens taken by W. M. Mann in Natal, Brazil.

Male. Eyes more convex and perhaps a little larger, head narrower behind, mandibles smaller, epinotum more sloping, more rounded and less angular than in the typical *globularia*. The color is also different, the body being dark brown, the antennæ and legs whitish or pale yellow, whereas in the typical form the body is black and the appendages brown.

Thirteen workers and four males from Albemarle and Tower Islands ("Albatross 1899", U. S. Nat. Mus.). Albemarle should be regarded as the type locality.

Cotypes, 2 specimens, No. 446, from Albemarle Island, Museum California Academy of Sciences, and 6 specimens from Albemarle in author's collection.

10. **Solenopsis globularia pacifica rubida**, new variety.

Worker. Length 1.8 mm.

Differing from the other forms of the species in color, the body being red, with the mandibles, antennæ and legs yellow and the first gastric segment, except its anterior and posterior borders, black. The postpetiole is globular, but little broader than long.

Described from a single specimen taken by Dr. Williams on Hood Island "under a stone".

Holotype, No. 447, Museum California Academy of Sciences.

11. Tetramorium guineënse (Fabricius)

Formica guineënsis Fabricius, Ene. Syst., 2, 1793, p. 357 ☿.

Myrmica bicarinata Nylander, Acta. Soc. Sc. Fennic. 2, 1846, p. 1061 ☿ ♀.

Myrmica cariniceps Guérin, Rev. Mag. Zool. (2) 4, 1852, p. 79 ☿.

Myrmica kollari Mayr. Verh. zool. bot. Ver. Wien, 5, 1855, p. 425 ☿ ♀ ♂.

Tetramorium cariniceps Roger, Berlin, Ent. Zeitschr. 5, 1861, p. 171.

Myrmica reticulata F. Smith, Trans. Ent. Soc. London (3) 1, 1862, p. 33 ☿.

Tetramorium kollari White, Ants and Their Ways, 1883, p. 262 ☿.

Tetramorium guineënse Mayr, Verh. Zool. bot. Ges. Wien, 20, 1870, p. 972 ☿.

A single worker of this undoubtedly introduced tropicopolitan ant from South Albemarle (F. X. Williams) and 14 workers taken by the "Albatross" (U. S. Nat. Mus.) but bearing only the label "Galapagos Islands, 1899." Emery records the species as taken also on the boat at Chatham Island by Dr. G. Baur.

12. Tetramorium (Tetrogmus) simillimum (F. Smith)

Myrmica simillima F. Smith, List Brit. Anim. Brit. Mus. 6, 1851, p. 118 ☿.

Tetrogmus caldarius Roger, Berl. Ent. Zeitschr. 1, 1857, p. 12 ☿ ♀.

Myrmica (Leptothorax) simillima F. Smith, Cat. Brit. Fossor. Hymen., 1858, p. 31 ☿.

Myrmica caldaria Meinert, Naturv. Aft. Dansk. Vid. Selsk. (5) 5, 1860, p. 334 ☿ ♀ ♂.

Tetramorium simillimum Mayr, Europ. Formicid. 1861, p. 61 ☿.

A single worker taken by Dr. Williams on Charles Island, "under stones near top of crater." This species, like *T. guineënse,* is a tropicopolitan "tramp" of Old World origin. It is not infrequently found in hot-houses in temperate regions.

Subfamily DOLICHODERINÆ.

13. **Dorymyrmex pyramicus albemarlensis**, new variety

Worker. Length 2.3—2.5 mm.

Resembling the var. *bicolor* Wheeler, but smaller and the head somewhat narrower and longer, with nearly straight sides and the epinotal cone smaller. The eyes are small, just in front of the middle of the head. Sculpture, pilosity and color as in *bicolor,* the head, thorax and antennal scapes a little more sordid red, the funiculi, petiole, gaster and legs dark brown or blackish.

Five workers from South Albemarle (F. X. Williams) and 19 workers from the same island taken by the "Albatross" in 1899 (U. S. Nat. Mus.). This form is very closely related to one of which several specimens were sent me by Mr. C. H. Tyler Townsend from Piura, Peru. The Peru form may be designated as **peruvianus**, new variety. It measures 2.5–3 mm. and is therefore as large as var. *bicolor.* The head is shaped like that of *albemarlensis* but the epinotal cone is as large as in *bicolor* and rather blunt. The color, however, is different, the head, thorax, petiole, legs, scapes, bases of funiculi and extreme base of the first gastric segment being clear, bright yellow, the remainder of the gaster black. The head is very smooth and shining, the remainder of the body a little more opaque, the pubescence is finer and less conspicuous.

Cotypes, 2 specimens, No. 448, Museum California Academy of Sciences; also 2 paratypes from Albatross collection of 1899.

14. **Tapinoma melanocephalum** Fabricius

Formica melanocephala Fabricius, Ent. Syst. 2, 1793, p. 353 ☿.

Lasius melanocephalus Fabricius, Syst, Piez. 1804, p. 417.

Myrmica melanocephala Lepeletier, Hist. Nat. Insect. Hymen. 1, 1836, p. 185.

Formica nana Jerdon, Madras Journ. Litt. and Sci. 17, 1851, p. 215 ☿.

Myrmica pellucida F. Smith, Journ. Proc. Linn. Soc. Zool. 2, 1857, p. 71 ☿.

Myrmica (Monomorium) pellucida F. Smith, Catalog. Hymen. Brit. Mus. 6, 1858, p. 124 ☿.

Formica familiaris F. Smith, Journ. Proc. Linn. Soc. Zool. 4, 1860, Suppl. p. 96 ☿.

Tapinoma melanocephalum Mayr, Verh. zool. bot. Ges. Wien. 12, 1862, p. 651.

Two worker specimens, one from the east side of Indefatigable Island, the other from Hood Island (F. X. Williams). This species is also recorded by Emery as having been taken on the boat at Chatham Island by Dr. G. Baur. Like the two species of *Tetramorium, Tapinoma melanocephalum* has been disseminated throughout the neotropical region from its original home in the Indomalayan region and has become a pest about houses and shops.

Subfamily CAMPONOTINÆ.

15. Prenolepis (Nylanderia) longicornis (Latreille)

Formica longicornis Latreille, Hist. Nat. Fourmis. 1802, p. 113 ☿.

Formica vagans Jerdon, Madras Journ. Litt. Sc. 17, 1851, p. 124 ☿ ♀.

Formica (Tapinoma) gracilescens Nylander, Ann. Sc. Nat. Zool. (4) 5, 1856, p. 73 ☿.

Tapinoma gracilescens F. Smith, Catalog. Hymen. Brit. Mus. 6, 1858, p. 56.

Prenolepis gracilescens Mayr, Verh. zool. bot. Ges. Wien, 12, 1862, p. 698.

Prenolepis longicornis Roger, Verz. d. Formicid. 1863, p. 10.

Five workers from Cormorant Bay, Charles Island (F. X. Williams). This species is of Indomalayan origin like *Tapinoma melanocephalum* and has also become a household pest throughout the tropics and even in some cities in temperate regions. It is known to nest on ships and has brought its Old World myrmecophiles, a beetle, *Coluocera maderæ,* and a cricket, *Myrmecophila prenolepidis,* to America. Both of these insects were recently taken by Dr. W. M. Mann on the island of Haiti in nests of *P. longicornis.*

16. **Prenolepis (Nylanderia) vividula guatemalensis itinerans** Forel.

Prenolepis guatemalensis Forel var. *itinerans* Forel, Mitth. Naturh. Mus. Hamburg 18, 2. Beih. 1901, p. 81 ♀.

A single worker from Indefatigable Island and two deälated females from Cormorant Bay, Charles Island, taken in October, 1905, by F. X. Williams. Two workers, a male and four females, taken by the "Albatross" in 1899 (U. S. Nat. Mus.), but labelled only "Galapagos Islands," also belong to this variety, which was originally described from specimens introduced into Hamburg with plants from Brazil. I have compared the Galapagos specimen with cotypes given me by Prof. Forel.

17. **Prenolepis (Nylanderia) fulva nesiotis, new subspecies.**

Worker. Length 1.6—2 mm.

Differing from all the known forms of *fulva* in its small size and in the shape of the thorax, the mesonotum being somewhat more convex and descending more abruptly behind to the constriction. On the other hand, the epinotum is distinctly less convex, its base about half as long as the declivity, which is straight in profile. Scapes extending two-fifths their length beyond the posterior border of the head. Sculpture and pubescence much as in the typical *fulva,* but the pilosity is less abundant and somewhat finer, especially on the legs and scapes. Dark brown, mandibles, clypeus, front of head, scapes, first funicular joint, legs and mesonotum paler and more reddish.

Female (deälated). Length 4 mm.

Differing from the worker in pilosity, the stiff erect hairs being absent on the scapes and legs, though conspicuous on the upper surface of the head, thorax and gaster. The pubescence is longer and denser and the whole body therefore slightly less shining. The thorax seen from above and excluding the epinotum is circular and broader than the head, which is small, subrectangular, fully as broad as long and a little broader behind than in front. The scapes extend about half their length beyond the posterior corners of the head.

Male. Length 1.5—1.75 mm.

Somewhat paler and more uniformly reddish brown than the worker and female. Wings gray, with brown veins and stigma. Pilosity much as in the female, but the pubescence sparser and shorter than in the worker so that the body appears shining. Antennal scapes reaching about half their length beyond the posterior corners of the head. Genitalia much as in the typical *fulva*.

Described from several workers and males taken by Dr. Williams on James Island (2000 ft., under stones) and two females from Chatham Island (low altitude, under stones).

Cotypes, 8 specimens, No. 449, Museum California Academy of Sciences.

At first sight I took these ants to represent a form of *P. vividula* or a small form of *P. bourbonica,* like the var. *hawaiiensis* Forel, but the genital appendages proved on dissection to conform to the *fulva* type. The new subspecies is, however, smaller than any of the recorded forms (subspecies *pubens* Forel, subspecies *biolleyi* Forel, var. *longiscapa* Forel). The mesonotum in profile is much like that of *biolleyi,* but the epinotum is distinctly less convex.

In the colony taken on James Island, Dr. Williams found six specimens of a myrmecophilous Bethylid, which proved to be a new species of *Scleroderma.* This is described by Prof. C. T. Brues in an accompanying paper.

18. **Camponotus (Myrmobrachys) senex** (F. Smith).

Formica senex F. Smith, Catalog. Hymen. Brit. Mus. 6, 1858, p. 47 ☿ ♀.

Camponotus senex Mayr, Verh. zool. bot. Ges. Wien. 12, 1862, p. 676; *ibid., 27,* 1877, p. 867, ☿ ♀ ♂; F. Smith, Proc. Zool. Soc. London 1877, p. 83.

Camponotus (*Myrmobrachys*) *senex* Forel, Rev. Suisse Zool. 22, 1914, p. 271.

Frederick Smith cites this well known neotropical species as having been taken on Charles Island by W. E. Cookson, commander of the "Peterel" on her voyage to the Galapagos in 1875. As no specimens of it are among the collections of the California Academy or the "Albatross" Expeditions, and

as Smith was notoriously careless in making identifications even of his own species, its inclusion among the Galapagos ant fauna must be regarded as doubtful.

19. Camponotus (Myrmamblys) macilentus F. Smith.

Camponotus macilentus F. Smith, Proc. Zool. Soc. London, 1877, p. 83 ☿.

Smith described this species very briefly from worker specimens taken by Charles Darwin on Charles Island as follows:

"*Worker.* Length, 2¼ lines. Pale ferruginous, with the legs pale testaceous, smooth and shining, and having a few scattered pale hairs. The head wider than the thorax, oblong, with the eyes large, ovate and black; the vertex slightly emarginate behind. Thorax compressed and much narrowed behind, convex above. Abdomen wider than the head, and oblong ovate. The scale of the petiole wedge-shaped and rounded above."

I have not seen specimens of this ant from Charles Island, but I have before me a number of specimens from many of the other islands and these specimens differ varietally according to their localities. Hence I am compelled to describe in detail the form from James Island, which is represented by the most complete series, as if it were the specific type and to compare with it the several other varieties. I assume that when the type from Charles Island is again collected, it will prove to differ at least as much from the other forms as these differ from each other. From the fact that Smith says nothing about the color of the abdomen of his specimen, I infer that it was probably without dark markings like the variety which I call *hoodensis.*

The following varieties show that *C. macilentus,* which has remained unknown to myrmecologists since it was described by Smith and has been placed by Forel among the *Camponoti incertæ sedis,* is a true *Myrmamblys,* rather closely related to *C. claviscapus* Forel, a species widely distributed in Central America, Brazil and the West Indies. *C. claviscapus,* however, is smaller and the worker major has a much more sharply rectangular head, with flattened and strongly and abruptly incrassated tips to the antennal scapes. This species

nests in hollow twigs, but Dr. Williams on the label to the specimens of *macilentus* var. *hoodensis* mentions their occurrence "under stones".

20. Camponotus (Myrmamblys) macilentus jacobensis, new variety.

Worker major. Length 7.5—8 mm.

Head about one-quarter longer than broad, subrectangular, a little narrower in front than behind, with nearly straight sides posteriorly and occipital border and the cheeks rather convex though feebly impressed near the insertions of the mandibles. Upper surface of head convex; eyes large, flat, elliptical, their anterior orbits distinctly behind the middle of the head, two small ocellus-like pits on the vertex and a sharply defined frontal groove extending half the distance from the clypeus to the posterior margin. Clypeus suboblong, one-quarter longer than broad, nearly as broad behind as in front, carinate on its posterior half, with a deep pit at the suture on each side in front; its anterior border feebly rounded, not produced, distinctly crenulate. Frontal area minute and indistinct, transverse, rather deeply impressed. Frontal carinæ more than half as long as the head behind the clypeus, strongly diverging, more than twice as far apart at their posterior as at their anterior ends. Mandibles rather small, very convex, 5-toothed. Antennæ slender, scapes curved, slightly flattened at the base, their tips gradually thickened, surpassing by a distance equal to their greatest diameter the posterior corners of the head. Thorax rather short, narrower than the head, laterally compressed behind, arcuate above in profile with sharply impressed promesonotal and mesoëpinotal sutures; pro- and mesonotum slightly flattened above, epinotum high, in profile with subequal base and declivity, the former convex, the latter abrupt, forming a rounded right angle with it, straight above and very feebly concave below. Petiole small, nearly as broad as the posterior end of the epinotum, but only about half as high as the epinotal convexity, its node broadest above, evenly rounded and entire, with moderately acute margin; in profile it is inclined forward somewhat and has a convex anterior and flat posterior surface. Gaster rather long and narrow, with subparallel sides

and the four segments of subequal length. Legs moderately long, the fore femora somewhat enlarged.

Smooth and shining, very finely and delicately shagreened; mandibles, clypeus and head slightly subopaque, covered with minute, shallow punctures, which are densest on the mandibles. Pro- and mesonotum with a few elongate, shallow foveolæ above.

Hairs pale yellow, erect, very sparse and rather short, confined to the dorsal surface, the venter and the tips of the scapes and femora. Pubescence pale, short and dilute, distinct only on the legs and antennæ.

Brownish yellow, legs pale yellow; mandibles, scapes and tarsi reddish, the mandibles with narrow blackish borders. Front, vertex and sides of meso- and epinotum clouded with brown and each gastric segment with a broad dark brown band across its posterior surface. This band expands in the middle to form a rather broad streak which reaches to the anterior border of the segment.

Worker minor. Length 4.5—5.5 mm.

Resembling the worker major, but the posterior corners of the head are much more rounded, the clypeus is trapezoidal and scarcely longer than broad and the antennal scapes extend about one-quarter their length beyond the posterior corners of the head. The puncturation of the head is less distinct than in the worker major so that this region is more shining. In other respects the sculpture, pilosity and color are very similar.

Female. Length 8—8.5 mm.

Closely resembling the worker major but the head is smaller and more narrowed in front, with the antennal scapes extending about one-sixth their length beyond its posterior corners, the petiolar node is thicker and much blunter, with its upper margin more transverse and very feebly impressed in the middle. The thorax is rather long and narrow, though as broad as the head, the mesonotum as long as broad. Wings long (nearly 9 mm.).

Sculpture, pilosity and coloration very much as in the major worker. Wings distinctly yellowish, with pale brown veins and pterostigma.

Male. Length 6 mm.

Head through the very large and convex eyes as broad as long, rounded behind, with straight, parallel cheeks. Clypeus subrectangular, as broad as long, carinate, with rounded anterior border. Mandibles indistinctly tridentate. Antennæ very slender, the scapes reaching about one-half their length beyond the posterior border of the head. Mesonotum nearly circular, as broad as the head through the eyes. Epinotum convex and rounded, without distinct base and declivity. Node very thick, blunt and low, its border transverse and very feebly impressed in the middle. Gaster and legs slender.

Sculpture and pilosity much as in the minor worker.

Brownish yellow, legs scarcely paler; ocellar region dark brown, gastric segments pale brown, except at their anterior and posterior edges. Wings colored as in the female.

Described from 10 major workers, seven minor workers, seven females and a single male taken by Dr. F. X. Williams from a single colony on James Island during August, 1906.

Cotypes, 12 specimens, No. 450, Museum California Academy of Sciences, and 12 specimens in author's collection.

21. **Camponotus (Myrmamblys) macilentus barringtonensis,** new variety.

Worker minor. Length 4—5.5 mm.

Differing from the var. *jacobensis* in its distinctly paler and more ivory-yellow color, the brown clouds on the vertex and thorax being paler and less sharply defined or more diffuse, so that in some specimens the whole meso- and epinotum is pale brownish. The bands on the gaster are narrower, their mid-dorsal expansion shorter and the color of these markings, though paler than in *jacobensis,* is nevertheless darker than those on the head and thorax. The knees are distinctly brownish.

Female. Length 8—8.5 mm.

Colored very much like the minor worker, but the bands on the gaster are broad and sharply defined and their mid-dorsal expansions are broken into spots.

Twenty-one minor workers and eight females from a single colony taken by Dr. Williams on Barrington Island during October, 1905.

Cotypes, 17 specimens, No. 451, Museum California Academy of Sciences, and 12 specimens in author's collection.

22. **Camponotus (Myrmamblys) macilentus duncanensis,** new variety.

Worker major. Length 5—5.5 mm.

Distinctly smaller than the two preceding forms. Head proportionally shorter, with less convex cheeks and broader clypeus, the antennal scapes extending nearly one-quarter their length beyond the posterior corners of the head. The punctures on the mandibles, clypeus and head and the foveolæ on the pro- and mesonotum are more feebly developed, so that the head is much more shining. The color is much like that of *barringtonensis,* pale ivory yellow, but there are no dark markings on the head and thorax and the bands on the gaster are narrow and rather sharply defined, reddish brown, the mid-dorsal marking either absent or present only as a narrow, more or less interrupted line.

Worker minor. Length 4—4.5 mm.

Colored like the worker major, but some specimens have the meso- and epinotum and a cloud on the vertex pale brownish. The bands on the gaster are usually reduced to brown transverse lines and the mid-dorsal markings are frequently absent.

Female (deälated). Length 7 mm.

Colored like the worker major, i. e. without any dark markings on the head and thorax. The gastric bands are well-developed, but there are mid-dorsal markings only on the third and fourth segment, where they appear as small spots. The head is shining, owing to the very feeble development of the punctures.

Male. Length 4.5—5 mm.

Differing from the male of *jacobensis* in color, the body and legs being rather dark brown, with paler brown thorax and antennæ. The wings are rather opaque.

Described from a single female, six major workers, 17 minor workers and four males taken August 13-14, 1906, by Dr. Williams on Duncan Island.

Cotypes, 14 specimens, No. 452, Museum California Academy of Sciences, and 12 specimens in author's collection.

The six specimens regarded as major workers may possibly be mediæ, but the whole appearance of the series, and especially of the female, suggests a distinct variety characterized by the small stature of all the castes and a very incomplete polymorphism of the worker caste in particular. The coloration of the male is peculiar.

23. Camponotus (Myrmamblys) macilentus albemarlensis, new variety.

Worker major. Length 7—7.5 mm.

Closely resembling the vars. *jacobensis* and *barringtonensis,* but the head is slightly broader in front and more nearly rectangular, and the clypeus is distinctly broader in proportion to its length, being only a little longer than broad and much less distinctly carinate behind. The antennal scapes do not reach beyond the posterior corners of the head. On the mandibles, clypeus and head the punctures are much finer than in *jacobensis* so that the surfaces are more shining. The color is similar to that of *barringtonensis* and *duncanensis,* being pale, ivory yellow, the gaster, coxæ and legs a little paler than the head and thorax, which are immaculate. The brown bands on the gaster are well-developed, darker than in *duncanensis,* but paler than in *jacobensis,* and there are distinct though interrupted portions of the mid-dorsal streaks. The knees are brownish, the antennæ and tarsi reddish.

Described from two specimens taken by Dr. Williams during May, 1906, on Mt. Cowley, South Albemarle.

Cotypes, 2 specimens, No. 453, Museum California Academy of Sciences.

24. Camponotus (Myrmamblys) macilentus vulcanalis, new variety.

Worker major. Length 5—6 mm.

Head and clypeus broad as in the preceding variety, but the head with somewhat more convex sides. Antennal scapes extending a distance equal to their greatest width beyond the posterior corners of the head. Clypeal carina obsolete. Thoracic dorsum in profile nearly straight, much less convex than in the other forms. Color brownish yellow, thorax immacu-

late, vertex sometimes faintly clouded with brown. The bands on the gaster are broad and rather dark brown but ill-defined anteriorly, their mid-dorsal expansions faint or lacking. The puncturation of the head is nearly as well developed as in the var. *jacobensis.*

Worker minor. Length 3.5—4 mm.

Resembling the worker major, but paler in color, with the gastric bands narrower and their mid-dorsal expansions obsolete.

Female. Length nearly 9 mm.

Very similar to the worker major in the form of the head and in color. The antennal scapes extend nearly one-quarter their length beyond the posterior corners of the head. There is a well-defined brown patch on the ocellar region and the gastric bands are broad and dark brown, covering the greater part of each segment, except the first. The wings are almost colorless, the veins and stigma brownish yellow.

Male. Length 6.5 mm.

Very similar to the male of the var. *jacobensis,* but the head and gaster are of a distinctly darker brown tint.

Described from three major workers, three minor workers, four females and five males taken by the "Albatross" in 1899 (U. S. Nat. Mus.) on Albemarle Island. Some of these specimens are very imperfect and part of them are greasy. The absence of color in the wings may be due to fading with age. The markings on the gaster of the major workers and females are deeper and more vivid, however, than in the fresher specimens of the var. *albemarlensis* taken by Dr. Williams, so that I do not hesitate to regard the two varieties as distinct. Two of the specimens, a worker minor and a damaged female, are labelled as taken at Tagus Cove. The dates on the other specimens indicate that they were taken at different times and possibly in other parts of Albemarle.

25. Camponotus (Myrmamblys) macilentus hoodensis, new variety.

Worker major. Length 7.5—8 mm.

Resembling the two preceding varieties in the structure of the head and clypeus and in puncturation. The antennal scapes extend a distance equal to their greatest width beyond

the posterior corners of the head. The color is pale ivory yellow, the gaster, coxæ and legs whitish, the head and thorax are immaculate and the bands and their mid-dorsal expansion on the gastric segments are narrow and so very faint as to be scarcely discernible. The knees, mandibles and tarsi are brownish yellow.

Worker minor. Length 5—6 mm.

Resembling the worker major but even slightly paler in color, almost white. The clypeus is as broad as long and distinctly carinate. The antennal scapes extend about one-third their length beyond the posterior corners of the head. The mandibles are scarcely darker than the head, with reddish teeth.

Described from five major and five minor workers taken by Dr. Williams in November, 1905, on Hood Island "under stones". This variety is readily distinguished by its very pale color.

Cotypes, 6 specimens, No. 454, Museum California Academy of Sciences, and four specimens in author's collection.

26. Camponotus (Myrmamblys) macilentus narboroënsis, new variety.

Female. Length of head and thorax 4 mm.

Head but little longer than broad and nearly as broad in front as behind. Clypeus a little broader in front than behind. The color is reddish yellow, the pleuræ, coxæ and femora pale yellow, the tibiæ, tarsi and antennæ more reddish, the mandibles scarcely darker than the head. Wings with a distinct yellowish tinge. The gaster and petiole are missing.

A single, greasy and defective specimen taken by the "Albatross" in 1899 (U. S. Nat. Mus.). More and better material will be required to establish the status of this form, which seems to represent a distinct color variety.

27. Camponotus (Myrmamblys) macilentus bindloënsis, new variety.

Worker major. Length about 8 mm.

Head large and rather broad, with distinctly rounded sides, slightly narrowed in front; cheeks without transverse impres-

sions. Clypeus subrectangular, distinctly longer than broad, scarcely broader in front than behind, with distinct carina. Antennal scapes extending a distance equal to their greatest width beyond the posterior corners of the head. Epinotum in profile convex, without distinct base and declivity. Petiole with the upper border rather blunt and feebly emarginate in the middle. Brownish yellow, with the pronotum, coxæ, femora and tibiæ pale yellow. Vertex faintly clouded with brown; gaster with broad, dark brown bands on the segments, but without mid-dorsal streaks. Mandibles red, with black teeth. Puncturation of head well developed, as in the var. *jacobensis*.

Worker minor. Length 3.5 mm.

Resembling the worker major but the posterior half of the head, the whole thorax and petiole pale brown as are also the paler portions of the gaster so that the bands of the latter are not sharply contrasted with the other portions of the segments.

Described from a single worker major and two minor workers (one very immature) taken by the "Albatross" in 1899 (U. S. Nat. Mus.) on Bindloe Island.

28. **Camponotus (Myrmamblys) macilentus,** variety.

A single major worker and two minor workers taken by the "Albatross" in 1899 (U. S. Nat. Mus.) on Tower Island probably represent a distinct variety, but all have lost the gaster and of the worker major only the thorax and legs remain. The specimens are small and all are very pale, like the var. *hoodensis,* the head and thorax being immaculate brownish yellow, the coxæ and legs white. The mandibles, except their teeth, are scarcely darker than the remainder of the head. The specimens are so imperfect that I refrain from introducing a new name.

29. **Camponotus (Myrmorhachis) planus** F. Smith.

Camponotus planus F. Smith, Zool. Coll. made by H. M. S. "Peterel", Proc. Zool. Soc. London 1877, p. 83 ☿.

Worker major. Length 5—6 mm.

Head rather large, trapezoidal, decidedly broader behind than in front, excluding the mandibles a little longer than broad, very convex above, flat beneath, with feebly convex sides, feebly and broadly excised occipital border and a distinct transverse impression on the cheeks. Eyes moderately large, flat, situated well behind the middle of the head. Mandibles short, convex, 5-toothed. Clypeus subrectangular, as broad as long, a little broader in front than behind, convex but not carinate in the middle, transversely impressed just behind the anterior margin, which is feebly but distinctly excised in the middle and rather deeply emarginate on each side. Frontal area very small, distinct, triangular. Frontal carinæ rapidly diverging in front, but parallel behind. Antennal scapes stout, funiculi slender, the former flattened, curved and very narrow at their insertions, extending about one-quarter their length beyond the posterior corners of the head. Thorax a little longer than the latter, including the mandibles, laterally compressed behind, with flat pleuræ; promesonotal and mesoëpinotal sutures very sharp and distinctly impressed; pronotum flat above, including the neck nearly as long as broad; mesonotum much narrower, flat, almost circular when seen from above, bluntly marginate on the sides; epinotum nearly as broad as the mesonotum, a little longer than broad, subcuboidal; in profile with the base a little longer than the declivity, both distinctly concave, the former horizontal, the latter sloping and separated by a sharp transverse ridge, which is slightly emarginate in the middle so that the apex of the epinotum viewed obliquely or from above is feebly bidentate. Petiole nearly as high as the epinotum, its superior margin blunt, broadly rounded and entire, its posterior surface flat, its anterior surface formed of two subequal planes meeting at an obtuse angle, the more ventral plane vertical and parallel with the posterior surface. Gaster rather large, elliptical; legs rather long and stout.

Opaque; mandibles, gula and sides of head, occipital corners, declivity of epinotum and sutures of thorax shining. Whole body very densely and finely punctate, the mandibles, cheeks, sides of head, antennal scapes, legs and gaster also with somewhat larger, sparser, shallow punctures which bear

the hairs and pubescence; the punctures on the sides of the thorax somewhat coarser than those on the dorsum.

Hairs short, erect, glistening, pale yellow, rather obtuse, sparse on the head, thorax and border of the petiole, more abundant on the gaster, absent on the cheeks. Pubescence short, appressed and sparse, but easily visible on the sides of the head, dorsum of pronotum and on the legs, especially on the tibiæ, on the gaster much denser and longer, so that it hides the sculpture and produces a silky or bronzy gray reflection.

Black; mandibles, except the teeth, front of clypeus, cheeks and sometimes the sides of the head, including the posterior corners, anterior portions of frontal carinæ, antennæ, legs, including the coxæ, rich ferruginous red; venter dark brown.

Worker minor. Length 3.5—4.5 mm.

Resembling the worker major, but the head smaller and proportionally longer, with more rounded posterior corners, the clypeus feebly carinate behind, the eyes situated a distance about equal to their length from the posterior corners. Antennal scapes much more slender, reaching about one-half their length beyond the occipital border of the head. Thoracic sutures less deeply impressed, the base of the epinotum more concave and the ridge separating the base from the declivity more pronounced and somewhat more distinctly bidentate.

Sculpture, pilosity and color practically the same as in the worker major.

Female. Length 8.5—9 mm.

Head smaller and narrower than in the worker major, the sides and posterior border straight, the antennal scapes less flattened. Thorax rather long, elliptical from above, a little broader than the head; epinotum with convex, rounded base passing gradually into the longer, sloping declivity. Superior border of the petiole distinctly emarginate in the middle.

Sculpture of the head resembling that of the worker major but the remainder of the body is more shining owing to its much finer and more superficial puncturation.

Pilosity like that of the worker, but the shining appressed pubescence on the gaster is distinctly shorter and sparser so that the black surface is more apparent and much more shining.

Color as in the worker major, but the anterior border of the pronotum and the mesonotum about the wing insertions more or less ferruginous red. Wings long (nearly 10 mm.), faintly brownish and rather opaque, with pale brown veins; pterostigma with a long hyaline area in the middle.

Male. Length 5 mm.

Head, including the eyes and mandibles, a little longer than broad, broadly and semicircularly rounded behind. Cheeks straight and subparallel. Eyes large and convex. Clypeus rather convex, broader than long, with straight, entire anterior border. Mandibles small and rather broad, with only the acute apical tooth developed. Antennæ very slender, the scapes terete, reaching only two-fifths their length beyond the posterior border of the head. Thorax broader than the head, mosonotum as broad as long, subhexagonal. Epinotum resembling that of the female. Petiole thick and low, subcuboidal, with flattened dorsal surface, seen from above transversely oblong, twice as broad as long. Gaster somewhat flattened dorsoventrally, with very slender genital appendages. Legs very slender.

Sculpture like that of the female; head, including the mandibles, subopaque; thorax and gaster more shining, densely and very finely shagreened, except the mesonotum and scutellum, which are more sharply shagreened and subopaque.

Hairs grayish, much less abundant than in the worker, absent on the thorax and almost absent on the head. Pubescence very feebly developed, even sparser on the gaster than in the female.

Black or dark brown; mandibles dull yellowish, anterior portion of head and clypeus, antennæ, epinotum, thoracic sutures, petiole, legs and tip of gaster more piceous. Wings colored as in the female.

Described from 10 major workers, five minor workers, three females and a single male taken during October 1905 by Dr. F. X. Williams from a single colony at Cormorant Bay, Charles Island. The label bears a note that the species is "common in old logs". I have also before me 18 well-preserved males taken by the "Albatross" on the same island (acc. 21,699, U. S. Nat. Mus.).

The specimen from which Smith drew his description was evidently a worker minor.

C. planus belongs to a group of small *Camponoti* which Forel has recently segregated as the subgenus *Myrmorhachis*. It comprises several neotropical forms rather closely related to *planus,* notably *quadrilaterus* Mayr, *rectangularis* Emery, *bidens* Mayr, *mucronatus* Emery. So far as known the American species all nest in hollow twigs or in dead wood.

30. **Camponotus (Myrmorhachis) planus peregrinus** Emery.

Camponotus peregrinus Emery, Ann. Soc. Ent. France, 63, 1893, p. 91 ☿.

Camponotus (*Myrmorhachis*) *peregrinus* Forel, Rev. Suisse Zool. 22, 1914, p. 274 ☿.

As I have seen no specimens of *planus* from Chatham Island, I regard the form described by Emery as possibly of varietal rank, although it is by no means certain that his specimen, which was taken by Dr. George Baur on the vessel, came originally from the island. I translate Emery's description in its entirety, although it contains very little that does not agree with specimens of the typical *planus*.

"*Worker minor.* Black, opaque, with the mouth, antennæ and legs, excepting the coxæ, ferruginous; pilose, with the head and thorax very sparsely pubescent, the gaster with dense griseoæneous, shining, silky pubescence. Head subrectangular, clypeus in front broadly rounded, obtusely carinate, mandibles short, 4-toothed, eyes at the posterior part of the head. Thorax with distinct sutures, dorsally depressed, sides obtusely marginate, epinotum behind abruptly truncate and obsoletely bituberculate, its declivity concave, somewhat shining. Petiole truncate behind. Head and thorax very densely, petiole more sparsely punctate; gastric segments transversely rugulose-punctate; mandibles, scapes and legs delicately punctate; legs without erect hairs. Length 4.3 mm.

"This species belongs to an exclusively American group, and among the species known to me in nature, it approaches most closely *C. quadrilaterus* Mayr, from which, however, it differs considerably. The head is a little longer than broad if it be regarded as truncated in front at a level with the

insertions of the mandibles. The eyes are very close to the occipital border, from which they are separated by a space less than half the length of an eye. This character is found also in the minor worker of *C. quadrilaterus*. The clypeus is broadly rounded in front, with a very blunt, median carina. The antennæ are long, the scapes surpass the occipital border by more than one-third their length. The thorax is rather slender (total length 1.9 mm., width of pronotum 0.9 mm.), with the sutures well-marked but not impressed, the dorsum depressed, bordered by obtuse ridges. The epinotum is narrowed posteriorly, where it is sharply truncated, the base rising a little at its posterior end and nearly in the form of a right angle with the declivity, which is concave longitudinally; the ridge separating the two surfaces is very feebly notched, so that if the insect is viewed obliquely from the side, the epinotal base seems to terminate on each side in a pointed projection. The petiolar scale is truncated behind, i. e. its posterior surface is flat and vertical when viewed in profile; it forms a very sharp and feebly rounded angle with the anterodorsal surface; the anterior and dorsal surfaces form a very obtuse angle.

"The head and thorax are opaque and covered above with very fine and dense thimble-punctures; the inferior surface of the head is shining; the sides of the thorax are a little less opaque than the dorsum and covered with coarser punctures; the epinotal declivity is rather shining and irregularly and transversely rugose. The mandibles and appendages are opaque and covered with exceedingly fine and dense punctures. The anterodorsal surface of the petiole has a sculpture very much like that of the thorax, but the punctures tend to flow together to form transverse striæ. This transverse confluence is even more pronounced on the gaster, the sculpture of which is almost completely concealed by the ashen, slightly bronzy pubescence which forms a pelt. The pubescence of the head and thorax is composed of short, scattered hairs. The coxæ are finely and densely pubescent. There are rather numerous, erect, yellowish hairs on the thorax and gaster, shorter and sparser on the front.

"Perhaps this ant is not specifically different from *C. planus* F. Smith, to which it seems to be very closely related. The

English author says nothing about the bronzy pubescence of the gaster and describes the petiole as having a different form."

The omission to which Emery refers was probably due to the age of the specimen described by Smith, since it was taken by Darwin on the voyage of the "Beagle" and not described till 42 years later. Smith's description of the petiolar node as "incrassate, narrow, the sides nearly parallel, rounded above", is not so very inapplicable to specimens which undoubtedly belong to the true *planus*.

31. Camponotus (Myrmorhachis) planus isabelensis, new variety.

Worker major. Length 6.5—7 mm.

Somewhat larger than the typical *planus,* with the sides of the head decidedly more opaque and with larger, scattered punctures. The cheeks bear short, erect, blunt hairs. The hairs on the front, vertex and thoracic dorsum are more abundant, and those on the gaster are somewhat shorter, the pubescence on the legs, especially on the tibiæ, is distinctly longer and less appressed.

Worker minor. Length 4—5.5 mm.

Very similar to the worker major in sculpture, pilosity and pubescence. The base of the epinotum is more concave in profile and much more distinctly bidentate posteriorly than in the worker minor of the typical form, and the border of the petiole is distinctly more acute.

Female. Length about 8 mm.

Resembling the worker major and differing from the female of the typical *planus* in pilosity. The pubescence on the gaster is noticeably longer and denser and more as in the worker. The petiolar border is entire.

Male. Length 5—5.5 mm.

Indistinguishable from the male of the typical form.

Described from eight major and three minor workers taken by Dr. Williams in 1905 on Cowley Mt., South Albemarle, and 16 major workers, 13 minor workers, five females and 27 males taken by the "Albatross" in 1899 (U. S. Nat. Mus.) on the same island.

Cotypes, 5 specimens, No. 455, Museum California Academy of Sciences, and 6 specimens in author's collection.

This variety is readily distinguished from all the other forms of *planus* by the erect, stubby hairs on the cheeks, the more abundant pilosity of the head and thorax and the longer pubescence on the legs of the worker and female.

32. **Camponotus (Myrmorhachis) planus indefessus, new variety.**

Worker major. Length 5—6 mm.

Body shorter and stouter than in the typical *planus* and var. *isabelensis,* the head larger and broader. Sculpture, pile and pubescence as in *isabelensis,* but the cheeks without erect hairs. The ferruginous red color extends back further on the head, covering the clypeus, cheeks and front and is suffused with the black on the sides and posterior corners. The antennæ and legs, excluding the coxæ, are somewhat more yellowish. The ridge between the base and declivity of the epinotum is scarcely impressed in the middle.

Worker minor. Length 4—4.5 mm.

Very similar to the worker major, even in the color of the head. Epinotum very feebly bidentate.

Described from six major and three minor workers taken from a single colony by Dr. Williams, Oct. 25-28, 1905, on Indefatigable Island.

Cotypes, 3 specimens, No. 456, Museum California Academy of Sciences, and 6 specimens in author's collection.

33. **Camponotus (Myrmorhachis) planus santacruzensis, new variety.**

Worker major. Length 5.5—6 mm.

Like the typical *planus* in stature, in the size of the head, sculpture, pilosity and color, but the hairs are even sparser on the dorsal surface of the head and thorax and the pubescence on the scapes, legs and gaster is distinctly shorter and finer, so that the gaster has a less silky lustre. The base of the epinotum is straight and horizontal in profile, not concave,

and the ridge between the base and declivity is semicircular and entire, without indications of teeth.

Worker minor. Length 4.5—5 mm.

Like the worker major, but the epinotum is slightly concave in profile just in front of the ridge between the base and declivity. This ridge is very narrow and indistinctly bidentate.

Female. Length 10 mm., wings nearly 11 mm.

Larger than the female of the typical *planus* and var. *isabelensis* and of a deeper black color, the thorax being without red markings. The pubescence on the gaster as in the type.

Male. Length 5—6 mm.

Like the male of the typical *planus,* except that the body and appendages are somewhat darker and more blackish.

Described from five major workers, 11 minor workers, seven females and five males taken during November, 1905. by Dr. Williams from a single colony on Indefatigable Island. Although this form occurs on the same island as the preceding it is nevertheless so different that I am compelled to regard it as a distinct variety.

Cotypes, 15 specimens, No. 457, Museum California Academy of Sciences, and 15 in author's collection and 8 in the Museum of Comparative Zoology.

34. Camponotus (Myrmorhachis) planus fidelis, new variety.

Worker major. Length 5.5—6 mm.

Resembling the var. *indefessus* in stature, in the size of the head, pilosity and sculpture, but the pubescence of the head and thorax is much shorter and less conspicuous. On the gaster it is dense and rather long and has a pronounced silvery lustre. The epinotum differs, however, from that of all the preceding varieties, the base being scarcely longer than the declivity and perfectly straight and horizontal in profile. The ridge separating it from the declivity is straight, transverse, rather blunt and entire, without any indications of teeth. The reddish color of the anterior part of the head is suffused with the black even on the vertex and occiput and

the pronotum and basal gastric segment are also distinctly reddish.

Worker minor. Length 3.5—4 mm.

Very similar to the worker major even in the structure of the epinotum. The red parts of the body, however, are distinctly more yellowish.

Female (deälated). Length 9 mm.

Colored like the worker major but with the anterior and lateral portions of the mesonotum, the mesopleuræ above and the sutures of the thorax and gaster ferruginous red. The pubescence on the gaster as in the female of the typical *planus*. The border of the petiole is blunt, transverse and entire.

Described from two major and six minor workers and a single female taken by Dr. Williams, Oct. 19-24, 1905, on Barrington Island. I do not regard the more reddish color of the head and thorax of all these specimens as due to immaturity.

Cotypes, 5 specimens, No. 458, Museum California Academy of Sciences, and 4 specimens in author's collection.

35. Camponotus (Myrmorhachis) planus fernandinensis, new variety.

Worker major. Length 6.5—7 mm.

With the stature and size of the head of the typical *planus* and very similar pilosity and color. The pubescence on the gaster, however, is shorter and dull grayish, without the silky lustre of many of the other varieties. The pubescence on the legs and scapes is very short and inconspicuous. The sculpture is most like that of the var. *isabelensis,* although the sides of the head are somewhat more shining and more feebly punctate as in the typical *planus*. The base of the epinotum is concave in profile and the ridge between the base and declivity is rather sharp and feebly emarginate in the middle.

Described from 10 specimens taken by the "Albatross" in 1899 (U. S. Nat. Mus.) on Narborough Island.

Cotypes, 1 specimen, No. 459, Museum California Academy of Sciences, and 4 specimens in author's collection.

This variety is most distinctly characterized by the short, dull grayish pubescence of the gaster.

36. Camponotus (Myrmorhachis) planus pinzonensis, new variety.

Worker major. Length 6.5—7 mm.

Very similar to the preceding variety and with the same kind of pubescence on the gaster, but the pubescence on the head, thorax, scapes and legs is more abundant though not longer. The base and declivity of the epinotum are subequal in profile and the former is perfectly straight and horizontal, the latter straight above; the ridge separating them is transverse and entire, without any indications of teeth.

Worker minor. Length 3.5—4.5 mm.

Very similar to the worker major, but the epinotum has the base feebly concave and bidentate behind.

Female. Length 7.5—8 mm., wings 8.5 mm.

Smaller than the female of the typical *planus,* with the pubescence of the gaster precisely the same as in the worker. The superior border of the petiole is distinctly emarginate in the middle. The pronotum and paraptera are tinged with ferruginous red and the legs and antennæ are more yellowish than in the worker. The head and body are more distinctly shagreened and much less shining than in the typical *planus.*

Described from five major workers, three minor workers and six females taken by Dr. Williams, August 13-14, 1906, on Duncan Island.

Cotypes, 6 specimens, No. 460, Museum California Academy of Sciences, and 8 specimens in author's collection.